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APPLICATION FOR PATENT

ON

HOME POWER LINE NETWORK CONNECTED PHONE

BY

FRANK LIEBENOW

U.S.P.T.O Customer

Number 24333

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Gateway, Inc.

Attn: Frank Liebenow

610 Gateway Drive, Y-03

N. Sioux City, SD 57049

(605) 232-1603

HOME POWER LINE NETWORK CONNECTED PHONE

BACKGROUND OF THE INVENTION

[0001] This application is related to, and claims priority to U.S. provisional application number 60/443,078, filed January 28, 2003, entitled "APPARATUS AND METHODS OF NETWORKING DEVICES, SYSTEMS AND COMPUTERS VIA POWER LINES", Attorney Docket Number P1930US00, the entirety of which is incorporated by reference herein, including all of the documents referenced therein. Additionally, this application is related to U.S. application titled, "POWER SUPPLY WITH MODULAR INTEGRATED NETWORKING," which was filed on even date herewith; attorney docket number P1991US00 and inventor Mark Rapaich and is related to U.S. application titled, "MODULATED DATA TRANSFER BETWEEN A SYSTEM AND ITS POWER SUPPLY," which was filed even date herewith; attorney docket number P1993US00 and inventor Keith Thomas.

FIELD OF THE INVENTION

[0002] The present invention generally relates to the field of cordless and cellular telephones, and more particularly, where such telephones network with and interact with a computer system. The present invention provides a method of transferring network data between the computer system and the telephone using power line networking.

BRIEF DESCRIPTION OF THE RELATED ART

[0003] Cordless and Cellular phones are in widespread use. There are very few households in the United States that don't have at least one of a cordless and cellular phone. The tendency of manufacturers of these phones is to make them smaller and smaller, while increasing the features and capabilities at the same time. For example, it is almost standard for a cordless phone to have a memory dialer or address book. Likewise, most every cellular phone has a memory of phone numbers. Newer cellular phones also

have access to the internet and the ability to take photographs. Both types of phones have a secondary power source, such as a battery, that is rechargeable. Both types of phones usually connect to a base station or charging adapter for charging this battery, and that base station or adapter connects to the power line for energy to operate and/or charge the batteries.

[0004] Providing all of this functionality in an ever shrinking form factor presents many user interface challenges. The displays are small and for some, hard to read. The keypads and touch screens are limited, making it difficult to enter alpha-numeric data. Today's phones overcome this limitation by reusing existing keys to represent several alpha-numeric characters. For example, to enter a "C", the user must press the "2" key four times. The first press enters a "2", the second press enters an "A", the third press enters a "B" and the fourth press enters the desired "C". Even though this interface works, it is tedious to use and requires much time and patience, especially when copying an address book to a new telephone.

[0005] Additionally, as these telephones increase in functionality, more information may be kept in the phone that may be needed in the user's computer system. For example, text messages and email messages may be received and viewed in the phone, but being that the phone has significantly lower storage capabilities than a typical computer, message archival is very limited. It would be useful have a way to transfer messages, notes, text and the like from the telephone to the user's computer system for later viewing, searching and archiving. Furthermore, there may be files located on the user's computer that might be needed on their telephone. The user may wish to copy part or all of their address book form their computer system to their telephone. The user may wish to copy some or all of their internet favorites from the computer system's browser to their telephone, especially considering the difficulty in entering internet web addresses on the telephone's keypad.

[0006] It would be possible to connect the user's computer system to their phone through a cable, but for many, the computer system is located in a different location in their home, other than where their phone base station or charger might be. Furthermore, even if the computer was in a convenient location, additional cables would be required above and beyond the power cable required to obtain energy to charge the phone. There

are several forms of networking available today. It would also be possible to connect the phone to a computer using networking, include networking over dedicated wires such as IEEE Standard 802.3, wireless networking such as IEEE Standard 802.11, wireless personal area networking such as Bluetooth and, more recently, networking over existing wires, including phone lines (Home Phone Line Alliance) or power lines (HomePlug™ Power Line Alliance and X.10 standards). Networking over power lines has recently become viable with technology promoted by the HomePlug ™ Powerline Alliance. This technology is especially useful for systems that generally require an external power source when operating, as the phone charger or base station in this invention.

[0007] Being that cordless and cellular phone base stations and chargers are generally connected to AC power in order to receive operating and charging power, it would be advantageous to integrate the power line networking into said base station and charger. In that, the charger or base station can provide charging power as well as networking from the same connection to household power.

[0008] The integration of power line networking into the base station and/or charger could also be provided as a module that could be inserted into the base station and/or charger and said module would connect to the AC power source through the base station and/or charger and perform all power line network functions required by the phone. Furthermore, network data can be transferred between the phone and charger and/or base station through a separate cable, a separate connection on a connector or the data can be modulate over the charging power coming from the base station and/or charger. The later is the subject of a related application referenced above.

SUMMARY OF THE INVENTION

[0009] The present invention is directed to a cellular or cordless phone whereby power line networking is either integrated within its base station and/or charger or added as a module that can be installed into the base station and/or charger. The present invention is further directed to a method of transferring network data between the cellular or cordless phone and another processing element connected to the power line without

any additional cables. With this invention, a power line networking enabled base station and/or charger can be installed into a system by connecting to only the home power line, thus being simple for the user to install, allowing distant access from various computing elements within the location and not creating clutter with additional cables.

[0010] It should be noted that this invention applies to base stations and/or chargers similar to those that are well known in the industry and used to power and/or charge cellular and/or cordless phones. A base station, for example, can be a device that physically supports the phone while providing electrical connections. A base station may include a power supply and charging circuits within its enclosure or it may be simply a support for the phone and a connector to the phone and the power supply and/or charging circuits may be located in a separate device, possibly a wall-mounted transformer arrangement, sometimes known as a wall-wart. Some of the charging and power supply circuit may be located in the wall-wart, some in the base station and possibly, some in the phone. A simple charger may be a wall-wart as well; the difference between it and a base station being that the charger may not support the phone. The charger or wall-wart may plug directly into the phone, possibly using a 1/8" phone jack or any other connection means available. There are many variations of charging and connection schemes and any variation does not veer from this invention.

[0011] It is to be understood that both the forgoing general description and the following detailed description are exemplary only and are not restrictive of the invention as claimed. The general functions of this invention may be combined in different ways to provide the same functionality while still remaining within the scope of this invention.

BRIEF DESCRIPTION OF THE DRAWINGS

[0012] The numerous advantages of the present invention may be better understood by those skilled in the art by reference to the accompanying figures in which:

[0013] **FIG. 1** shows a block diagram of a phone charger and phone with power line network capability where the network data is transferred to the phone by modulation over the charging power connection.

[0014] **FIG. 2** shows a block diagram of a phone charger and phone with power line network capability where the network data is transferred to the phone by modulation over a separate data connection, perhaps a second set of contacts on a connector.

[0015] **FIG. 3** shows a block diagram of a phone connected to a personal computer through the power line network interface.

DETAILED DESCRIPTION

[0016] Reference will now be made in detail to the presently discussed embodiment of the invention, an example of which is illustrated in the accompanying drawings.

[0017] Referring now to **FIG. 1**, a block diagram of a phone charger and phone with power line network capability where the network data is transferred to the phone by modulation over the charging power connection is described. The block diagram of the phone charger **110** includes an AC input connector **105** that is coupled to an AC to DC power conversion circuit **140**. In current practice, DC power is most widely used to power and charge the phone, though in another embodiment AC power is used and power conversion circuit **140** would convert AC power into AC power, perhaps a lower voltage AC power and/or at a higher frequency. The phone charger includes coupling and isolation components for power line networking **120**. The coupling and isolation components **120** couple the power line networking signals to and from the AC power while blocking and/or isolating high voltage AC power.

[0018] Power line networking interface **130** receives and sends networking data through coupling and isolation components **120** and receives and sends data to the phone through modulator/demodulator **150** and isolation and coupling **152.** Although it is known for these types of phone chargers to have multiple output voltages, the example shows an embodiment with one DC output. In this example, the DC output is conducted on wires **160** through connector **170** to power phone **180**. Connector **170** may be of any type known in the industry. Wires **160** may be bundled together in one cable and may be of any length, but usually are between a few feet and a few yards. Phone **180** may obtain its operating and charging power from the DC voltages present on wires **160**, but for

simplicity purposes, the power connections of system **180** to wires **160** and connector **170** are not shown, nor are the conditioning circuits. Generally, the DC voltages may be routed to a power conversion circuit within phone **180** to further condition the DC power and generate whatever voltages are required to charge and/or operate phone **180**. For example, the DC voltages on wires **160** may be approximately 9V, and the power conversion circuit within system **180** may convert that voltage to voltages required by the components within the phone, for example 3.3V and 5V as well as provide charge current to the phone's internal battery. It is also possible that one or more AC voltages are provided by AC to DC conversion circuit **140**, making this possibly an AC to AC conversion.

[0019] Network data is transferred over the DC voltage **160** in a modulated fashion. It is well know in the industry how to modulate data over a DC voltage and any method may be used, including frequency modulation, pulse width modulation, Orthogonal Frequency Division Multiplexing (OFDM), quadrature modulation, Quadrature Amplitude Modulation (QAM), for example. Isolation and coupling circuit **192** transfers the modulated signal between the DC input voltages **194** and the modulator/demodulator **190** within phone **180**. The data is then transferred to and from the phone's **180** internal processing components that are not shown for simplicity reasons.

[0020] Referring now to **FIG. 2**, a block diagram of a phone base station and phone with power line network capability where the network data is transferred to the phone by a data connection is described. The block diagram of the phone base station **210** includes an AC input connector **205** that is coupled to an AC to DC power conversion circuit **240**. In another embodiment of this invention, power conversion circuit **240** converts AC to AC power, perhaps at a lower voltage and/or at a higher frequency. The phone charger includes coupling and isolation components for power line networking **220**. The coupling and isolation components **220** couple the power line networking signals to and from the AC power while blocking and/or isolating high voltage AC power.

[0021] Power line networking interface **230** receives and sends networking data through coupling and isolation components **220** and receives and sends data to phone **280** through digital interface **252** and separate conductors **250** of connector **270.** Although it is known for these types of phone base stations to have multiple output voltages, the

example shows an embodiment with one DC output. In this example, the DC output is conducted on wires **260** to connector **270** which mates with connector **271 of** phone **280**. Connectors **270** and **271** may be of any type known in the industry. AC voltages would work equally as well. Power from the DC voltages present on wires **260** pass through connectors **270** and **271** and power and/or charge phone **280** through internal power and charging circuit **292**. Internal power and charging circuit **292** generates whatever voltages are required to charge and/or operate phone **280**. For example, the DC voltages on wires **260** might be approximately 9V and the internal power and charging circuit **292** may convert that voltage to voltages required by the components within the phone **280**, for example 3.3V and 5V as well as provide charge current to the phone's internal battery.

[0022] Network data is transferred between base station **210** and phone **280** through contacts **250** of connector **270** which mate with contacts **251** of connector **271** located on phone **280**. Although shown as two conductors, any number of conductors may be used depending upon the method by which data is transferred between base station **210** and phone **280**. Data may be transferred by any means known in the industry, in serial or parallel. A standard interface may be used such as RS-232 or Universal Serial Bus, for example, or a proprietary interface may be used. The data signals may have their own ground return or may use one of the power connections as a ground return. The data is then transferred to and from the phone's **280** digital interface **290** and eventually to internal processing components that are not shown for simplicity reasons.

[0023] Referring now to **Fig. 3**, an end-to-end system with a phone networked to a personal computer is described. In this example, personal computer **310** has a processor and memory **320** and storage **330**. In this example, perhaps storage **330** is a persistent storage device, possibly a hard drive or flash memory. Also, contained within storage **330** may be information that may be useful to be downloaded to the phone, for example, an address book or an address book entry. Connected to the processor and memory **320** is a Home Plug power line networking interface **340**. This interface **340** receives and transmits networking signals to and from processor and memory **320** over power line **350** to other devices connected to the same power line. In this case, networking signals are sent and received to and from a similar Home Plug power line networking interface **370**

within the cordless or cellular phone base station **380**. It should be noted that in previous embodiments, it was shown that this interface may be made in different ways and may be part of a wall-wart or other means of embodiment without veering from the intent of the present invention. Interface **370** is then connected to the controller and memory **390** of a phone that is connected to the base station or wall-wart. Being that interface **370** and interface **340** provide a data connection between personal computer **310** and the phone, data such as the address book or address book entry may be transferred over power line **350** between personal computer **310** and the phone. Alternately, data may emanate at the phone and transfer into personal computer **310** for storage in storage device **330** or the like.

[0024] It is believed that the present invention and many of its attendant advantages will be understood by the forgoing description. It is also believed that it will be apparent that various changes may be made in the form, construction and arrangement of the components thereof without departing from the scope and spirit of the invention or without sacrificing all of its material advantages. The form herein before described being merely an explanatory embodiment thereof. It is the intention of the following claims to encompass and include such changes.